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ORAGE

—OR—

HAY CROPS

SB 193
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ROCK ISLAND-FRISCO LINES



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F. S. WHITE

Agricultural and Horticultural
Commissioner

Frisco Bldg.

ST. LOUIS, MO.

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THE Agricultural and Horticultural Departments are constantly issuing Bulletins covering various farm topics, and are desirous of placing them in the hands of every farmer along our lines.

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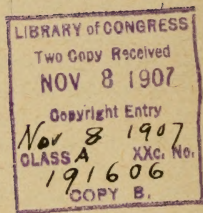
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CORRECTIONS.

On page 14, under the heading KAFFIR CORN, the second paragraph should read as follows:

"There are a great many varieties of Kaffir Corn; in fact, we have a line of plants that may be properly termed or classed with the non-saccharine sorghums. Some of these are the Milo Maize, Jerusalem Corn and Broom Corn. Such plants as Broom Corn Millet, African Corn or African Millet may be classed with the family of millets. In fact, there has been no little confusion in trying to properly classify this family of plants."

On page 16, under the heading JERUSALEM CORN, the paragraph should read as follows:

"This is regarded by many growers as the surest and best crop for all dry countries, even better than Kaffir Corn. It grows from three to six feet tall, makes one large head on the main stalk, which, soon after forming, turns or goosenecks over towards the ground. It is not uncommon to see from four to eight side shoots with heads on one stalk. It is often used for parching, for breakfast foods, and the seeds are ground and mixed with our buckwheat, from which our breakfast cakes are often made. The grains are pure white and nearly flat. The leaf development is about the same as that of Kaffir Corn. When sown in drills, three feet apart, five pounds of seed will plant one acre."

On page 33, under the heading GERMAN OR GOLDEN MILLET, the second paragraph should read as follows:

"Seedsmen usually list two varieties of this Millet, the Common and the True Tennessee German Millet. The soil and climate of Tennessee seem to be ideal for the production of the seed of this millet and so the claims that Tennessee grown seed produces the best crops seem to be well founded."

On page 39, under the heading JOHNSON GRASS, the fourth paragraph should read as follows:

"It grows from three to ten feet high according to soil and is set from the ground up with thick blades which furnish the greater part of its feeding value."

On page 42 the second paragraph should read as follows:

"The question is often asked me, 'Is there any way by which we can rid our fields of it?' To this question, let me suggest this plan."

On page 45, under the heading ORCHARD GRASS AND CLOVER, the first paragraph should read as follows:

"In many sections of our country, Orchard Grass and Clover form a better combination, etc."

Introductory.

In the perusal of this book, the reader should keep in mind that no writer can give information that will answer for all soils, climates and conditions. No stereotyped rule can be given that will hold good for all soils and climates. The farmer is a creature of circumstances and is, or should be, governed largely by local surroundings, soil and climatic conditions. What every farmer in every section needs mostly to make farming a success is a good supply of common sense that will enable him to know how to take full advantage of his local surroundings. A sensible farmer can select from a work of this kind such information as is best adapted for his local surroundings. I have never written a book thinking that I could meet all requirements, but instead I write these bulletins from a practical standpoint keeping in mind all the time that there are but few farmers who cannot find in them some good points that may be turned to good advantage on their farms. With this view of the case my advice to the reader is to read this work with care, select that which applies to your case and put the same to practical use.

Remember, that in this busy age of the world that the average farmer cannot take time to read volumes in order to get a few practical ideas. So I have condensed in my books the practical experiences of the most successful farmers of the world, and have these experiences condensed so that the reader can sit down and read one of these books through in an evening, go right out the next day and put into practice the information that applies to his local conditions.

Where this book fails to give the information needed on any point the reader should write to me giving full description of his soil and general conditions. With this information, I may be able to serve you better.

How to Do Things.

Coming in contact, as I am, with farmers in all parts of the country, I find that, as a rule, farmers care very little for big words or long descriptions, history or origin of varieties. What the farmer wants is information regarding soils best suited for the various crops he is growing when and how to prepare the soil, when to plant, how to cultivate, when and how to harvest and when and how to market, so as to obtain the best results and greatest profits. These are the questions I shall endeavor to answer in this bulletin, and if in any case I have failed to answer them to the satisfaction of the reader, further information will be given upon application.

Copyrighted.

While it is my desire to impart as much general information as possible upon many agricultural subjects, yet I very much dislike to see my writings so liberally quoted and copied from and no credit given to the author. So I have decided hereafter to copyright all my books, and notice is here given that all rights are reserved and will be protected.

FORAGE OR HAY CROPS.

How to Grow, Harvest and Cure.

BY F. S. WHITE.

The crops most important, after our clovers and grasses, are our plants from which we make hay. Of this line of plants we have a great number to choose from. Like the clover and grass families, we have hay plants suited for all soils and climates. Many of these plants furnish both pasture and hay, but as a rule crops wanted for hay should not be pastured. If pasture is wanted, sow for pasture, but do not expect the same crops to furnish an abundance of both hay and pasture. Our hay crop is fast becoming a leading crop and more attention is given to this crop each year. New plants for hay are being introduced and old ones improved. Our hay crop is supplementary to our grasses and clovers, for in order for us to get the best results from our grasses and clovers they should be followed by the use of hay. There are seasons and times when our grass crops or pastures become short from dry weather or from over pasturing and during such times we should have an abundance of these forage or hay crops to feed our stock in order that we may not lose the flesh the stock have gained from pastures. Then again, hay crops are or can be cheaply grown and quickly harvested and saved especially when the weather conditions are just right. However, in this as in all other farm operations the farmer has to take chances. There are many reasons why our

hay crops deserve better attention. In the first place, providing an abundance of hay is a business proposition, as a good supply of hay on any farm greatly reduces the grain bill, and besides it is not best to feed stock too much grain. With a good supply of clean, bright hay, work horses and mules can go through the summer's crop work in fine condition, and will give far more service than if fed largely on grain.

While we have been increasing the average yield and tonnage of our hay crops each year, yet, the price and demand for good hay has also been on the increase and good hay is in greater demand at higher prices now than ever before. The government report on our hay crop for 1906 placed the value of the crop as being worth \$600,000,000.00, yet with this enormous amount of hay we were short of the demand. Our hay crop is yet in line with our other great crops of this country in this respect: that we should have grown every ton of hay produced in the United States in any year of our past history on half the acres we have devoted to the crop.

There is an old saying, "Whoever could make two blades of grass to grow where only one grew before would deserve better of mankind than the whole race of politicians put together," and this saying is a true one.

Now, in writing this book, I want to assist the farmers who live along our lines with information that will enable them to increase the yield and profits of their hay crops. In order to do this, we must first have good soil and this soil must have the right kind of preparation and plant food. The question of soils suited for each of the hay plants mentioned will be treated under the heading of each variety.

Another very important feature is the management and handling of the hay after the crop is grown, so that it may be well enough to give here a few pointers on this part of the subject so as to get the best results and greatest profits. As the time when the hay is harvested has much to do in determining the value of the crop, I will first take up this subject.

When to Cut Hay Crops.

The leaves or blades of nearly all our hay plants contain a large per cent of the feeding value, so to get the best results from our hay plants they should be cut before they become so ripe as to cause the leaves or blades to shed off in the handling of the crop. The hay crop should not be allowed to become dead ripe before cutting. In such a case the leaves not only shed off but the stems become hard and woody and hay made from such crops has but little value. The best time to harvest the hay crop is when the plants are in full bloom. This varies with the different hay plants, so that further instructions will be given under the heading of the different plants named. Another very important matter in making fine hay of most crops is not to leave the hay exposed to the hot, burning sun any longer than is necessary. The main thing with all hay crops is to cure them so as not only to preserve their feeding properties, but also to have the hay retain its bright green color and sweet odor. Of course, in this we have to be governed largely by weather conditions. Some of our hay plants, such as sorghum and peas, may require a week of bright, clear weather to mature, while other crops, such as many of our grasses, may be cut and cured with from one to two days of good weather.

With this outline I will proceed to give a description of some of our best plants for hay, as well as the directions for growing and harvesting each.

Sorghum.

(Andropogan Sorgham.)

HISTORY AND DESCRIPTION.

Sorghum is a native of Africa and was first brought from that country to the United States about fifty years ago, since when it has been introduced and successfully grown in nearly every state in the Union. While Africa seems to be the home of most of our sorghums, yet

varieties of this plant are found in India and other foreign countries. We have two families of sorghums, the saccharine or sweet sorghums and the non-saccharine, both being extensively grown over a great part of the United States. Both types are practically alike in their growth habits and require the same kind of soil and cultivation. The sweet sorghums are well adapted for and are grown more extensively for fodder than are the non-saccharine varieties. In fact, the sweet sorghums are so far superior to others for fodder that they should be used exclusively, especially where they will grow equally as well as the non-saccharine sorghums. The only advantage that any of the non-saccharine varieties may possess is that some of them may be better suited for our arid and semi-arid sections. Again, some growers claim that where sorghums are to be grown for seed that the feeding value of the seed of some of the Kaffir corns is superior to that of the sweet sorghums and that the yield per acre is much greater. This is perhaps true, but where fodder is the object the sweet varieties are the best though they may be more difficult to cure.

For Syrup.

Several years ago quite an acreage of the sweet sorghums were grown for the manufacture of syrup, but it seems that this industry is gradually fading away. Extensive experiments at sugar making from sorghum have never proven satisfactorily in this country. So there is not nearly so much syrup being made from sorghum now as there was a few years ago. However, we have varieties of sorghums which have been carefully selected that produce a very fine quality of syrup, and syrup made from these sorghums ranks as one of the purest and best syrups now made in our country. The manufacture of pure sorghum syrups for home use should be encouraged as it is one of the healthiest sweets that we have. This is especially true while the syrup is new. Sorghum syrup keeps much better during our hot summers than will the syrup made from our Sugar cane.

Unfortunately, our sorghums have become s mixed with Kaffir corns as to destroy their value for syrup. This is true of our western crops. Where sorghum is to be grown for syrup great care should be taken to keep it pure and to breed varieties and select seed of the most profitable sorts. Sorghums for syrup should be planted as early as the season will permit.

I cannot give more space here to the subject of syrup-making, as this is a work on hay. However, if information is wanted on this subject, full directions covering the whole subject will be furnished on application.

Varieties.

The best varieties for syrup are the Albaugh, Early Orange, Red Top and Amber.

For forage or hay the Imperial and Early Amber are both extra good sorts, though all may be used for this purpose. It should be kept in mind that different sections may require different varieties and that some of these varieties may prove to be better suited for some sections than they are for others. But for general purposes, I would select varieties in the order named here.

Soil and Soil Preparation.

The sorghum plant is a strong, rapid grower and a greedy feeder so that it succeeds best on a deep, rich, moist soil. Sorghum is very similar to our common corn in its growth habits, but as a rule, it is a stronger grower than corn so it can be made profitable even on thin soils. However, like Indian corn it grows best on deep, rich, sandy loams and strong lime soils, as well as on our best clay soils. All soils for sorghums should contain a vast amount of humus and where very thin soils have to be used large quantities of well-rotted barnyard manure should be used. Where sorghums are to be grown for hay humus and nitrogen are the main plant foods needed, while if grown for syrup nitrogen, phosphoric acid and potash, are all needed. The soil should be broken deep early in the season and kept well cultivated until time to plant the seed.

Planting.

The best time for planting this crop for forage varies from about the middle of March in the extreme south to the first of June in the northern states but in no section should the seed be planted until danger of frost is past.

The seed may be sown in drills from two to three feet apart and the crop cultivated or they may be sown with a press drill or broadcasted plowed or cultivated in, after which the soil should be left smooth.

Quantity of Seed Per Acre.

This varies, depending upon the locality, soils, varieties and for the use to be made of the crop. When sown for forage alone one to two bushels per acre will usually answer. When sown in drills one peck to one bushel or if sown in drills for syrup four quarts of good, clean seed will be ample.

Cultivation.

When sown in drills the crops may be cultivated with any corn cultivator or a five tooth Planet Jr. one horse cultivator can be used to good advantage. Where the soil has been prepared properly before seeding one to three cultivations will be all that is required. When the crop is sown in with a drill or broadcasted in a good harrow may be used. Frequently we have heavy packing rains which cause the soil to settle around the plants so that if the harrow is used to open up or loosen this crust as soon after one of these hard rains as the soil is dry enough to work it will prove of great benefit to the crop. Sometimes it may be well to use a disc harrow. This applies in particular to heavy clay or tenacious soils. Crops on sandy soils with a loose, gravelly sub-soil will need less cultivation.

Sorghum is such a strong growing crop that where the seed bed has been properly enriched and prepared before the seeds are sown that it will usually take care of itself against all weeds and grass.

Used For Various Purposes.

There are a number of ways to use and make sorghum a profitable crop. Sorghum and oats sown together in early spring make a fine pasture for hogs. When sown for this purpose it will be best to sow broadcast, using about one bushel each of the oats and sorghum. This crop may be sown early, and pastured off in time to use the land for a second crop, that of cowpeas and sorghum for hay. This makes a fine combination for hay. When sown this way use not less than one bushel each of the sorghum and peas per acre. When this is used as a second crop later in the season it will be necessary to put in the seed deeper than is required for the first crop. This depends largely upon the soil and weather conditions. The peas in most cases will have to be planted deeper than the sorghum seed.

As to variety of peas best for this purpose, it is hard to decide as we have so many good varieties to select from. For most soils and sections I would select the following varieties in the order named: Clay Crowder, Whipporwill, Red Ripper, Black Ripper and Clay.

Any of the above named sorghums will answer, however. I would recommend for comparison with those named above a combination of the Imperial sorghum and Clay Crowder peas. But as stated before, we have such a great variety of both sorghums and cowpeas that it should be an easy matter to find varieties suitable for all sections. This, of course, will have to be determined largely by experiment.

Harvesting.

As a general rule, the best time to cut sorghum for hay is when it is in bloom and before the seeds begin to form. Some growers prefer to cut even earlier, just about the time the heads are well formed or have attained full size.

As stated before, much of the feeding value of all our hay plants is contained in the blades or leaves, so that if the crop is firing from dry weather and the blades begin to burn, the crop should be cut as soon after the heads are formed as

possible. It usually requires about one week of good, hot sunshine to cure the hay. The main point is to cure the hay so that it will not sour when stacked or stored away. One of the best plans is to cut after the dew is dried off the plants and leave the crop on the ground for two days when it should be raked up into windrows, where it may remain for two days more, when it will be ready to put into hay cocks. These hay cocks may be made five or six feet tall and four feet in diameter at the center and rounding out to a point at the top.

Now we have four days from cutting until the hay is in the cock. Here it should remain for three days more or if there is no danger of rainy weather, it would be well to leave it in the cock for a week, during which time fermentation will have taken place, after which the hay is ready for the stack or the barn. When stacked, it is often best to use alternate layers of straw or some other hay made from millets or grasses. The stacks should be well capped out with straw. The hay, if thoroughly cured, may be safely baled, but it should be spread out and thoroughly dried before being put into bales. Of course, we have to be governed by weather conditions in this matter, as in all other farm operations.

Yields.

The yield and the value of the crop depends largely upon the season, soil and methods of growing and saving the crop, the yield ranging from one to fifteen tons per acre. From three to five tons per acre can always be expected.

For a Soiling Crop.

⁂ We usually have a period of dry weather in summer, often lasting through July, August and September, when our grasses becomes short, dry and tough and sometimes fails entirely. During this period we need soiling crops and it is here that sorghum comes to our relief, as it is a great drouth resister, and because of its feeding value, it is one of the best crops that can be grown for this purpose.

The dairyman will find in sorghum one of the best of crops for keeping up the flow of milk with his cow during the usual periods of short grass. In fact, no wise dairyman should start out in the spring without planting a good acreage of sorghum and Mammoth sugar corn for feed for his cows. Sorghum may be safely fed green to all animals on the farm from the poultry up to the horse and cow with very profitable results. Care must be taken in not feeding too much at the start before the animal has become accustomed to it. Commence to feed in a small way or in small doses and increase the feed according to the requirements of the animal. I have heard of cases of bloat in cattle when fed on sorghum, but never knew of a case where the crop was wisely used.

For Pasture.

Mention has been made of the value of oats and sorghum sown together for pasture for hogs, and some stock men claim that this crop is better to fatten hogs than alfalfa. It is also fine for cattle and sheep, but caution is needed against turning hungry sheep and cattle on sorghum, especially when it is wet.

When Used For Silage.

Experiments made with sorghum as silage vary greatly, some feeders regarding it as being almost equal to corn and clover, others placing it in line as follows: Indian corn, alfalfa, cow-peas, sorghum.

The great difficulty with sorghum when used as silage, is its tendency to develop acidity. This might be overcome or prevented by using it with other plants, such as alfalfa, clover or cow-peas. Some experiments along this line have proven quite satisfactory.

Feeding Value.

Regarding the feeding value of sorghum, there are various opinions, these being based upon various experiments. I regard sorghum and cowpea hay, grown, cured and fed together, as

the best all-round hay that can be produced on our farms, better even than alfalfa hay, as it makes almost a complete feed. The cowpea hay if fed in connection with any of our hays made from grasses is of greater value than when it is fed alone. Sorghum hay contains a high percentage of fat and protein. Cowpea hay is also rich in protein and is an excellent substitute for wheat bran, hence its importance and value, especially to the dairy farmer.

It would be well for the reader to send to the department of agriculture at Washington, D. C., as well as to the various state agricultural colleges for bulletins treating of this subject more fully, as I cannot spare the necessary room here that is needed for a full explanation of this part of this subject, which is determined largely by analysis.

Sorghum and Cowpeas.

One of the greatest objections, in fact the only one, offered against growing sorghum and cowpeas together for hay is that the combination is difficult to cure. This crop should be cut and managed the same as that recommended for the sorghum and when we can have a week of bright sunshine at the proper time, there should be no more difficulty in curing the two together, than there would be in curing them separate.

When to cut this combination crop depends largely upon weather conditions, as well as the stage of growth of the plants. Usually, when the sorghum is in bloom and the peas are forming in the first pods set on, this is the best time. But where the weather is dry and the blades of the sorghum and leaves of the peas begin to turn yellow and fall off, then it will be best to cut so as not to lose the feeding value of the blades and leaves.

It is always best to store this hay in barns or in some good hay shed, rather than to stack it. When stacked it would be well to mix in an occasional layer of oat or bright wheat straw, then cap off the stacks well with straw or some of the coarser grasses.

Seeded Ribbon Cane.

This is comparatively a new variety of the saccharine sorghums, and one, the merits of which have been well aired in our agricultural papers.

Growers seem to differ widely in their experiences with this crop. I planted seed of it on my experimental farm in Missouri in 1907, but the season was very unfavorable, so I could not tell from its growth on my farm much about it, and had to depend upon outside information for my description of this variety. I have had many good reports from it, both from a syrup and forage standpoint.

One grower in Texas told me that he grew a crop, that the stalks averaged sixteen feet tall and produced six hundred gallons of syrup per acre. Reports of from three to four hundred gallons of syrup are quite common. The syrup is said to be of superior quality. Hog growers say that as a pasture or feed for hogs that it is superior to all other sorghums.

One of the best plans for our readers, especially those who live in the southern states, is to plant a small plot and find out by actual experiments whether or not it is an improvement over the older sorts, and whether or not it is adapted for your particular section.

The seed are grown for sale quite extensively in Texas, and there should be no trouble in procuring a supply.

A friend in northern Texas sent me some sample stalks of seeded ribbon cane which measure fourteen feet in length, are large in proportion to the length and contain a high per cent of juice of very high quality. This sample indicates that the favorable reports of this variety are well sustained, and as stated above, its claims are well worth investigation by experiment on every farm in all sections, where the seasons are long enough for it to mature.

Most varieties of our saccharine sorghums can be successfully grown in all sections of country tributary to the Rock-Island-Frisco lines.

Kaffir Corn.

(*Andropogon Sorgham Valgaris.*)

HISTORY AND DESCRIPTION.

Kaffir corn was introduced into the United States about the year 1885 from South Africa, of which country it is a native and takes its name from the African tribe known as the Kaffirs. It was first introduced into the southern states, but since has been distributed over the greater part of the United States. While Kaffir corn seems to thrive in all sections of our country, yet its greatest field of usefulness, no doubt, is in the arid sections.

There are a great many varieties of Kaffir corn; in fact, we have a line of plants that may be properly termed or classed with the non-saccharine sorghums. Some of these are the Milo Maize, Jerusalem corn and Broom corn. Such plants as Broom corn, millet, African corn or African millet may be classed with the family of millets. In fact, there has been no little confusion in trying to properly classify this family of plants.

Of the saccharine and non-saccharine sorghums there are many varieties. Of the Kaffir corns, the red and white varieties seem to lead in usefulness and are more generally used. As stated in former pages, I can see no good reason for growing Kaffir corn for fodder where our sweet sorghums will succeed. The advantage of the Kaffir corn is that it will resist drouth and extreme heat in our arid and semi-arid sections, better than will our sweet sorghums. In fact, Kaffir corn has been known to remain green for weeks of the severest, dry, hot weather. During these hot periods it will stop growth, stand still, remain green and as soon as it gets moisture it will start a new and vigorous growth.

Another advantage of Kaffir corn is that large quantities of it are produced in sections where our common corn would prove an entire failure.

The same preparation of soil, planting and cultivation as recommended for the other sorghums should be practiced in growing Kaffir corn.

Where sown in drills, to be cultivated, six to eight pounds of seed per acre will answer. Where sown broadcast for fodder, use from one-half to one bushel per acre.

Harvesting.

Usually, there is very little trouble in curing Kaffir corn for fodder. It is cut and bound with the corn binder, and shocked in rather large shocks which are, as a rule, left in the open field until wanted for feed. This is the manner of handling it in the western states. I will give a brief description of each of these plants as they have proven themselves under various tests. The feeding value of each is largely determined or influenced by soil, climate, weather conditions, cultivation and harvesting.

White Kaffir Corn.

This variety grows from four to eight feet tall. The heads which are formed in the top of the stalk range in length from six to fifteen inches. As early as these heads begin to show seed development, the joints next below the top send out seed heads, so that the crop yields an enormous amount of seed. Where the seed is the object it will be well to cut out the first or top heads as soon as they are ripe as this will cause a better development of the second crop of heads. The blades are wide and thick, they remain green during our dryest weather and make an excellent fodder which may be used either green or dried.

Red Kaffir Corn.

This variety usually grows taller than the white and the stalks are more slender. The heads grow long and slender and measure from twelve to eighteen inches in length. The seeds are red smaller than the white, and rather hard and brittle. It is some earlier than the white, and thrives better on thin soils.

Jerusalem Corn.

This is regarded by many growers as the surest and best crop for all dry countries, even better than Kaffir corn. It grows from three to six feet tall, makes one large head on the main stalk, which soon after forming, turns or goose-necks over towards the ground. It is not uncommon to see from four to eight side shoots with heads on one stalk. It is often used for parching for a breakfast food, and the seed are ground, then all mixed with our buckwheat from which our breakfast cakes are often made. The grains are pure white and nearly flat. The leaf development is about the same as that of Kaffir corn. When sown in drills three feet apart, five pounds of seed will plant one acre.

Milo Maize.

Milo maize produces enormous crops of seed and where seed is the object, it would be more profitable to grow than Kaffir corn. Both heads and seed are large. Heads weigh often a full pound. It will yield from fifty to one hundred bushels per acre of seed. This is one of the best crops in dry sections to sow on our stubble land, as the wheat and oats are being harvested.

Brown Duorrha.

Brown Dourrha is very similar to the Jerusalem corn. The grain is the same size and shape, but of a brown color, instead of white. Like the Jerusalem corn it withstands dry weather, and will yeild crops every year. It is grown more for grain than for fodder. It is fine to sow after wheat and oats.

Feeding Values.

There are many opinions as to the feeding values of the above mentioned non-saccharine sorghums and this is true of both the seed and fodder feeding values. The best plan will be to test the feeding value of these plants by actual

experience on each farm. I do not think it at all advisable or profitable to feed the grain of any of these plants whole, in fact, more than half the feeding value of the seed is lost by doing so. The seed should be ground and used in a mixed ration for the best results. However, the whole grain may be fed to poultry as they do their own grinding. Most of these grains are excellent poultry feed.

Reports from our various experiment stations vary in giving their experiments and analysis of the feeding value of these plants and their seed. But there is no question but that much more feed may be produced per acre from any or all of these plants in many of our dry sections than we could possibly get from our common corn which is the unit of measure for the feeding value of all our grains.

Cowpeas.

HISTORY AND DESCRIPTION.

This is the great plant for all the southern states, for grain, hay and to be used as a soil renovator. The cowpea as a soil builder has been for years to the south what the red clover has been to the north. In the past few years it has been proving its value and adaptability in helping to build up the soils of the north and west, as well as the south. In the last ten years it has worked its way through Missouri, Indiana, Ohio, Illinois and as far north and west as Central Iowa, and has given good crops in all these states.

It is a great plant to use as a catch crop and can be planted after wheat and oats, and on every spot of land not occupied by other crops. It may be sown in all fields of corn at the last plowing of the corn, when it will make a good crop of hay, even if no seed, and at the same time be furnishing plant food to the soil. While it will grow on almost any soil, yet clay soils seem best suited for it.

The cowpea is a tender annual, easily effected by frost and cold, wet weather, so should not be planted until all danger of frost is past and

the weather becomes warm and the soil dry. It is really a dry weather plant and thrives much better in dry than in cold, wet weather. It may be grown for grain or for hay or both as both make the best of feeds.

In former pages, I have shown the value of sorghum and cowpeas grown together for hay. They are also grown alone and make a hay of the highest feeding quality.

The seed are very nutritious and are much used as human food, both in the green and dry states.

While the plant grows on the very poorest of soils and is used for enriching such soils, yet it is not to be understood that it will not respond to better soils and good cultivation, so that where profitable crops of hay are wanted, it should be planted on rich soils.

The question often comes up as to the economy of turning under cowpea vines to enrich the soil. This depends upon circumstances. Where the soil is very poor and quick action is wanted it may be well to turn under a crop of pea vines; in such a case, it will be well to put on a ton or even more of pure lime per acre, then sow the land at once to rye.

As the greater part of the fertilizing quality is in the roots, it is best and most economical to cut for hay, feed the hay to stock on the farm and turn back to the soil the pea vines in form of barnyard manure. It would be very poor economy to sell this hay off the farm.

Sown For Hay.

Where sown for hay, the soil should be plowed deeply and early in the season, kept well cultivated and harrowed and the seed bed made fine until time to plant, when the seed may be sown with a drill or by hand, broadcast, and cultivated in, using from one to two bushels of seed per acre, according to the soil and the variety of peas used.

They can also be sown in drills from two to three feet apart and cultivated. However, it is generally more profitable to sow broadcast. When planted for seed it is best to plant in drills and cultivate. One half bushel of seed per acre will answer when sown in drills.

There are a great many varieties, some of which are trailing, while others are half-runners and others are of the bunch variety.

Some are early and others late. The early varieties are more in demand in the north, while in the south, it makes practically but little difference, as all will mature. Where grown for hay or for green manure, the longer or larger vining varieties are generally preferred.

However, it is not always that the longest runners are the most profitable to grow for hay, for, as shown in former pages, the greatest value of all hay crops is in the leaves and blades, so in selecting varieties, we should look well to the leaf development. Select varieties that have large, broad, thick leaves, rather than varieties with long vines and small thin leaves.

Some of our half runners are better in this respect than are many of the long running varieties.

We have many sizes and colors also, but the color has very little to do in determining the value as a hay crop. However, I should prefer the white varieties for table use and the best of these are the White Rice or Soup Pea, the California Blackeyed and the Texas Cream. These are all very fine table varieties. They are also fine varieties for stock, as well as for soil improvement. The whippoorwill and clays are very commonly used for hay.

Harvesting.

This has been partly explained under the heading, "Sorghum and Cowpeas," and as then stated, the peas should be cut so as to save the leaves. If the weather will allow, it is usually best to wait until the vines begin to seed and when the seed in the first pods are in the dough

state, but if the weather is very dry so that the leaves are turning yellow and falling off, the crop should be cut at once. The directions as given for handling sorghum hay and sorghum and cowpea hay will apply equally as well for pea hay alone. The main thing is to handle it so as to save as much of the leaves as possible, and at the same time to cure the hay so that it will retain its bright green color and sweet odor.

Saving the Seed.

Cowpea seed have been high for several years and will continue to remain high from the fact that the work of gathering and saving the seed had to be performed nearly entirely by hand. The seed ripen so unevenly, ripe pods and blooms are on the vines at the same time, so that we cannot use machinery to harvest the crop, without considerable loss of seed.

The best plan I have found is to keep the ripe pods picked as they ripen, for if left for the whole to get ripe, the first pods may rot or the rain may cause them to pop open and the seed fall out on the ground. It would require but little time and effort for every farmer to grow and save what peas he would need for seed. There is nearly always time enough wasted on every farm to save not only what peas are needed for seed, but to save seed corn and many other seeds that are used on our farms.

Used as Poultry Food.

Cowpeas and cowpea hay are relished and are just as valuable for the poultry on the farm as they are for the horse, mule and cow. In fact, if one desires the finest quality of flesh in poultry, a field of these peas should be planted near the chicken house, where the poultry may have free access to pasture on the peas and eat all they want.

Chickens are very fond of them and the flesh of a fat chicken fattened on cowpeas furnishes the very best of meats for breakfast.

Origin.

The origin of the cowpea is not well defined some claim it to be a native of China, others place its early growth to India. According to De Candolle, it is a native of India and was cultivated there three thousand years ago.

It was introduced into this country in Georgia and South Carolina about the year 1734, so has been in cultivation in America for more than 150 years. But this is all practically immaterial to the farmer; what he wants to know mostly is how to grow and manage the plant so as to obtain the greatest profits.

Yield.

The yield of hay ranges from one to six tons per acre, according to sections, soils and seasons. It is claimed by many growers that a greater yeild of hay may be had by sowing the crop in drills and cultivating once or twice. While this may be true yet a crop grown this way would, as a rule, be more difficult to cure for hay as the stems would contain more water. For hay I should prefer the broadcast plan of growing the crop.

The yield of seed varies greatly. When grown in corn five or six bushels per acre is about the yield; when sown in drills and cultivated, ten to fifty bushels per acre may be grown. The feeding value of the hay, as before explained, is of the very highest quality, better than clover or timothy

Very much more could be said in favor of the cowpea, which deserves a prominent place in every farm rotation on all farms in our southern states. However, the information here given should interest every reader in this valuable plant and enable every one to succeed in growing big crops of both hay and seed. Should further information be desired regarding the cowpea, it will be given upon application from the reader.

The sections of country tributary to the Rock Island-Frisco Lines where the cowpea may be profitably grown embraces all of our territory in Alabama, Mississippi, Arkansas, Texas, Oklahoma, Louisiana, Missouri and the southern and central Iowa, Southern and Central Illinois and Southern Indiana. The reader should write me regarding varieties best for each section.

Soy or Soja Beans.

HISTORY AND DESCRIPTION.

The Soy bean (often incorrectly called Soja bean) is one of our best legumes and is supposed to be a native of southeastern Asia. It has been grown in the United States for many years. From some reason, this valuable forage plant has not received the attention that it deserves. Its progress has been slow and so far its growth has been confined almost exclusively to our southern states. It has been grown in an experimental way in nearly all of our states.

Description.

Its growth habit is of the bunch form, growing stiff and upright from two to four feet high. The pods are short, covered with hair and contain from one to four beans. The plant, cut when the seed are well formed in the pods, makes an excellent quality of hay, almost as good as that of the cowpea.

The greatest feed value, however, is in the seed and excepting the peanut, there is no other known grain which contains such high percentages of protein and fat in such a highly digestible form. To get the best results, the beans should be ground and mixed with other feeds. It is a tender annual so should not be planted until all danger of frost is past and the weather is warm and dry. While it is a dry land plant, and will grow on our poorest soils, yet it will respond to better treatment, if planted on good soils and will yield immense crops. The same kind of soil and soil preparation as out-

lined for growing cowpeas will answer for the Soy bean and like the cowpea they may be sown in corn at time of last cultivation.

There are several varieties, early, medium, late; white, black and green. From my experience with them and observation of them I would recommend that they be more generally used.

The best plan to grow them is to plow the land early and keep it cultivated until time to plant. Plant in rows three feet wide and cultivate. When sown in drills one-half bushel of seed per acre will be sufficient. It yields enormous crops, the branches are thickly set with pods from the ground to the top of the plant, a single plant often containing as many as 200 pods. From 20 to 50 bushels of seed is about the yield per acre.

The territory tributary to the Rock Island-Frisco Lines suited for the Soy bean is just the same as those sections named for the cowpea, for where one of these will grow, the other will grow also.

Peanuts.

HISTORY AND DESCRIPTION.

The origin of the peanut is not well defined. Some writers claim China, others Japan, while others claim Brazil as the original home of this plant.

Like the cowpea, the peanut plant is a tender annual and should not be planted until the weather becomes warm; usually right after corn planting is the best time to plant. The peanut is a legume, the same as the cowpea and Soy bean. Peanuts have been grown in this country for years, their growth for commerical purposes having been confined to our southern states, Virginia, Georgia, Alabama, Tennessee and the Carolinas being the leading states in their production. Texas and Oklahoma are now also producing great crops.

The tops of the peanut plant make fine hay, relished by all stock while the roots furnish rich food for both man and stock.

Soil and Soil Preparation.

The best soil for the peanut is a deep sandy loam, which should be plowed early in the season and made very fine. From twenty to thirty bushels of pure rock lime should be applied per acre, the amount of lime to depend upon the supply of humus in the soil. Lime burns up humus readily, so large quantities of humus are needed. The lime puts the soil in a fine, physical condition as well as giving the nuts a bright, clean appearance. The lime should be applied in the early spring, sown broadcast on the freshly plowed soil and harrowed in. Various methods are employed for planting the crop. Some growers plant in check rows, which are marked out three feet apart each way and two nuts planted in each hill. This method allows cultivation each way with the horse cultivator. Other growers plant in drills, rows three and one-half feet wide and two nuts in each hill. Some growers plant in ridges, while others prefer level cultivation. When grown for hay, the level system is preferable.

After the soil is well prepared, a good plan is to mark out the rows three and one-half feet wide with a shovel plow, plant two kernels in hills fourteen to eighteen inches apart, according to the variety used. It requires about two bushels of the nuts in pod to plant one acre.

The covering of the seed may be performed by the foot, hoe, a small plow or a harrow. It is a good plan to cover with a good harrow, and in a few days, just before the plants are up, harrow the field at right angles. After this the cultivation is easily performed. The Planet Jr., horse hoes, either one or two horses, will do the work to perfection.

Harvesting.

The crop is cheaply harvested and often stock are allowed to do this part of the work. Hogs can be turned in to eat the tops or the tops may be cut and cured for hay, after which the hogs may be turned in to root out and eat the nuts.

The largest and best crop of peanuts I ever saw was on the farm of Mr. J. M. Padgett of Brewton, Alabama, a field of fifty acres. The soil was a light sandy loam, which had been well fertilized and highly cultivated. This crop was grown by the level system and the yeild was something near one hundred bushels per acre.

The peanut crop, like all other crops, will pay in proportion to the amount of attention that the crop receives.

Yield.

The yield is from fifty to one hundred bushel per acre of nuts and from one to three tons o hay. At least, this is such yields as should be obtained from the crop.

Peanuts as Food for Man.

Peanuts are used in many ways for food and we now have factories that clean, sort, grade and make a number of food products, such as roasted and salted nuts, peanut butter and peanut candy. Oil is also extracted from them which is used for soap making, etc., while a refined oil is made which is used as a substitute for lard and butter in cooking. So that besides the value of the crop for hay, the nuts are valuable as food for both man and beast.

Varieties.

There are numerous varieties of the peanut. Red Spanish is one of the most profitable sorts to grow for stock. There is practically no difference between the Virginia and Tennessee Red and this is the best variety to grow for all common purposes. The Texas Jumbo is the largest of all the varieties grown in this country.

Peanuts in the pod weigh twenty-two pounds per bushel. Every Southern farmer should plant at least a few acres of peanuts, for, as stated, where work on the farm is crowding, the peanut crop can be profitably harvested by the stock

on the farm. A combination of peanut, sweet potato and alfalfa hay, with just a little corn to finish up, will give cheap pork on our farms. In pasturing or "hogging" a crop of peanuts, a good plan is to prepare movable fences and allow the stock on a few acres at a time. By this plan the stock will not run over and waste the crop. Peanuts are fine for chickens and they, too, may be allowed to assist in the harvesting.

The Rock Island-Frisco territory, where peanuts may be grown, embraces all land tributary to our lines in Alabama, Mississippi, Tennessee, Arkansas Louisiana, Texas and Oklahoma.

NOTE—The term Oklahoma now included all the country once known as the Indian Territory.

Field Peas and Oats.

This combination makes an excellent quality of hay. This crop is suited for the northern states and would not be profitable in the south or southwest. The Canadian pea is used to sow with oats for hay. The Colorado field pea, which, on account of cultivation and climatic conditions, seems to be quite an improvement on the old Scotch or Canadian varieties, and is now extensively grown in Colorado with oats for hay, as well as being grown in large quantities for the seed, which are fed to stock at a great profit. The finest mutton in the world is now grown in Colorado from pea fed lambs. This has become a great industry in Colorado and both mutton and pork produced from peas command the very highest market prices.

One of the greatest advantages of the pea crop is that stock may be allowed to gather the crop in the field, thus saving the expense of harvesting.

Where peas and oats are sown together for hay, seedings should be made early in the season, using about one bushel each of the peas and oats, both of which may be sown with our regular grain drills or may be sown broadcast, cultivated in and the soil left smooth with the use of a harrow. The best time to cut this crop for hay is when the peas are forming in the pods and the

oats are in the dough state. The hay is easily cured and furnishes fine feed for all stock. This crop should be more generally grown. It is truly wonderful what results are being obtained in the growing and feeding of Colorado peas in the valleys of Colorado.

The sections of country tributary to the Rock Island-Frisco Lines best adapted for the growing of field peas and oats for both hay and grain is Minnesota, Dakotas, Northern Iowa and Northern Illinois.

Florida Velvet Beans.

This is a great stock plant for our southern states, but it is not at all adapted for our northern states. It is one of our valuable legumes regarded by many of our southern farmers as even better for soil renovating than the cowpea. It is used as a forage plant and for hay.

The seed requires a long season, nearly eight months for maturing. It is difficult to harvest for hay, owing to its rank growth, so is not easily cured. Stock will eat the entire crop in the field.

The seed furnishes excellent feed for all stock on the farm. It is a good plan to allow the seed to ripen, leave them in the field until the beans become soft from exposure to the weather, when all stock may be turned on and allowed to eat them in the field.

Velvet beans will grow on nearly all soils, yet like most other plants, the better the soil, the greater the yield. Owing to the growth and heavy weight of fruit the vines put on it is not at all advisable to plant them in corn or in among young fruit trees. The vines frequently grow fifty feet long and set great clusters of pods, which are soft and hairy like velvet.

As stated before, seed will only mature in the extreme southern part of the United States, where we have seven or eight months free from frost, yet they can be grown in many sections for green forage and as a fertilizer for the soil. On my experimental grounds at Springfield, Mo., vines have made a growth of thirty feet,

which were loaded with fruit or pods and many of the beans attained full size, but none ever ripened. So that velvet beans would prove a valuable crop for green forage and as a great fertilizer as far north as southern Missouri.

Soil and Soil Preparation.

A sandy soil with a good clay subsoil would be best, though clay soils also give good crops. The soil should be plowed deep and harrowed fine as early in the season as it is dry enough to work and kept in a fine condition, free from weeds until seeding time. On very thin soils, if the seed are wanted for feed, it will be best to use some fertilizer and where well rotted barnyard manure is not to be had some high grade commercial fertilizer, containing a high per cent of acid phosphate, should be applied.

Seeding.

Seeding in the south should commence in early March and continue through May, according to the locality. The plant will not grow until the soil and weather both become warm. Velvet beans should be planted at the same time we plant our watermelon seed, as one is about as sensitive to the cold as the other.

The best plan is to mark out furrows with a shovel plow, four feet apart, drop two to three seed in a hill, the hills being three feet apart. Planted this way they can be easily cultivated with any common cultivator. They can also be sown broadcast and plowed in.

One to one and one-half bushels of seed per acre are required when sown broadcast, while a half bushel is sufficient to plant an acre in drills. It is necessary that we cover the seed deeper than we do when planting cowpeas and soy beans.

The seed, when fully matured, are so hard, almost as hard as flint, that it requires both moisture and heat to get them to germinate or soften so that stock can eat them.

Harvesting.

As stated before, it is often best to allow the stock to harvest the crop right in the field, thus returning a large percent of the fertilizer to the soil. However, there are seasons when the crop may be cured for hay and if the crop is properly managed it makes an excellent quality of hay. The hay should be handled so as to save as much of the leaves as possible. Where there is from ten days to two weeks of dry, hot weather, which we often have in the south, there should be no trouble in curing and saving the hay.

As a Soil Cleaner.

Another great advantage of the velvet bean is that it cleanses the soil of all foul weeds and grasses. It completely smothers everything else out.

As soon as the leaves are full grown, they drop off and the new ones take their places, so that the earth is covered with these leaves which prevent the growth of other plants, and at the same time they shade the soil and furnish it with plant food. There are so many sections and soils tributary to the Rock Island-Frisco Lines where the velvet bean would prove valuable and where it is badly needed, that I have given a rather long description and such directions for planting that the reader may easily grow them.

The velvet bean should be more generally planted. The scarcity and high price of the seed have prevented many farmers from growing this valuable crop.

The Rock Island-Frisco Territory where velvet beans can be grown to advantage and profit takes in all of the territory tributary to our lines in Alabama, Mississippi, Arkansas, Louisiana and Texas and many of the sandy lands along the rivers in Oklahoma. However, it may be well to state that they should be grown in an experimental way in the extreme northern sections of Texas and Arkansas.

Vetches.

HAIRY OR SAND.

(*Vicia Villiosa*,)

The vetch seems to be a native of Europe where it has been grown for centuries, but vetches are of recent introduction into this country. Of the many varieties, the winter or hairy vetch seems to be the only variety valuable in this country, and this is better adapted for growing as a winter crop in our southern states than for any other purpose or section.

It is a leguminous plant, belonging to class of plants as the cowpeas; it is very frequently called or referred to as the winter cowpea. Vetch furnishes either hay or pasture. Winter oats and winter vetch sown together make hay of excellent quality, as well as giving great yields. The black winter oat or the Texas Red Rust Proof would be the best oats to use. Sow two bushels of oats and twenty-five pounds of vetch seed per acre. Where sown for pasture rye or barley would be best to sow with it, using not less than one bushel of rye, or one to two bushels of Tennessee winter barley and thirty pounds of vetch seed.

Here is another fine combination for large crops of hay. Where rye or barley is used as recommended above, sow twenty pounds of vetch and fifteen pounds of Burr Clover seed per acre. Where the soil is sandy use Crimson clover instead of Burr clover. The best time to seed these crops in the south is the latter part of summer, August and September. This combination may also be sown at the last plowing of the cotton or corn.

Remember vetches are suited only for our southern states and to be used as a winter crop.

Millet.

HISTORY AND DESCRIPTION.

Millet is a cereal grass and is now cultivated in nearly all parts of the world. The time of its introduction into this country is an uncertainty.

It is more suited for and more extensively grown in the southern states, though varieties are to be found in nearly every state of the Union. The family, known as foxtail millets are the most important varieties grown in this country. This species was common in China about three thousand years B. C.

It is an annual, grows from two to six feet high with profuse foliage and the flowers abundant.

In the United States it is used almost exclusively for fodder, though for the last few years the grain has become more generally used as a poultry food. In many countries as China, India and Japan, the seed are used extensively for human food. Japan alone used about 40,000,000 bushels of seed each year for human food.

Chief Use.

Millet in this country is used as a catch crop where other crops have failed to grow. It is not, as a rule, used as a main crop though it is advisable to recommend it as such. Where a crop of corn, cotton or some of our early crops have failed to grow from various causes, a crop of millet may also be grown. Wet soils that remain wet until late in the season may also be sown to millet. Frequently a crop may be sown after harvesting the early grain crops. Where land has become foul with weeds and grass, a crop of millet will clear the soil of all these. Under such conditions as these, millet may be grown to good advantage and profits.

Soil and Soil Preparation.

Millets are of rapid growth, so consume large quantities of plant food, as well as requiring a great amount of moisture. Deep, rich soils, clay soils, are the best for millet. The soil should be broken deeply and the seed bed made fine before sowing.

Heavy clay soils will require more work in preparing, but will give better returns in the end. However, millet may be grown on almost any of our soils where corn can be grown.

Seeding.

In the southern states, where the crop is grown as a primary crop, seeding may be done from April to July according to location. In the northern states seeding time ranges from May to and including June. The seed may be sown with a drill or broadcast. When sown broadcast, from one to one and one-half bushels of seed per acre are used, depending on the soil and seed. Where sown with a drill, usually three pecks per acre will be sufficient. Good, clean, new seed only should be used. Where sown broadcast care should be used in getting the seed evenly distributed. The seed may be harrowed in with a smoothing harrow.

Harvesting.

Millet should always be harvested for hay before the seed becomes ripe. In fact, after the seed ripen the hay is of little value. The best time to cut is when the crop is passing out of bloom and the seed begin to form.

It is not a difficult matter to save millet hay, as it quickly cures when the weather is dry. After it becomes well wilted it is best to get it in windrows where it will cure in one or two days if the weather is hot and dry. When cured this way, it retains its bright color and sweet odor. Millet hay, like all other hay should not be exposed to the hot sun more than is necessary for curing, for sun-burned hay is of little feeding value. The hay may be stacked with perfect safety, but if the weather will permit, it is best to put it in haycocks for several days and stack from the cocks rather than from the windrows. Usually millet hay is easily cured and saved.

Feeding Value.

Millet is fed principally as a hay and forage crop. It deserves to be more extensively used for soiling purposes, for, like sorghum, when pastures become short, if good crops of millet were grown, it would greatly help out the feed question and would enable the farmer to keep more live stock on his farm.

Millet hay well cured is almost as good as timothy hay, but it is not quite as high in fat and crude protein, but in other respects is fully equal to best timothy. I have fed millet hay with the best results to horses, mules, cattle and sheep, as well as for young mules. The seed may be fed to good advantage to poultry and hogs.

Varieties.

We have many varieties of millets and new varieties are being introduced each year. I will only notice here a few of the leading sorts such as have proved a success in our country under various tests.

German or Golden Millet.

This has been the leading variety in many sections of our country. It produces enormous crops of both hay and seed, often producing as high as four tons of hay per acre. Where grown for seed, it produces from fifty to seventy bushels per acre. Both hay and seed are of superior feeding value as compared with some of the older sorts.

Seedsmen usually list two varieties of this millet, the Common and the True Tennessee German Millet. The soil and climate of Tennessee seem to be ideal for the production of the seed of this millet and so the claims that Tennessee grown produces the best crops seem to be well founded.

This variety seems well adapted for all sections and is more generally used than any other. It is not so early as some of the smaller sorts and will not resist drouth quite as well as other varieties of less value.

Missouri Millet.

ALSO CALLED TENNESSEE AND COMMON.

This is one of the oldest varieties, that is, it has been grown in this country longer than most sorts. It grows tall and unless sown thickly it is likely to grow coarse.

Manitoba or Hog Millet.

A comparatively new variety of recent introduction into this country is the Manitoba or Hog Millet. Some wonderful claims are made for it. It is claimed that the seed are very valuable for hog feed.

The peculiarity of this millet lies in the fact that the seed ripen while the stalk and blades are yet green, so that it may be cut and threshed, thus getting both a hay and seed crop. It is claimed that the seed have great fattening properties.

New Siberian Millet.

This is another variety of recent introduction into this country, for which the highest claims are made. It is said to even surpass the German for large yields. The claims made by its introducers are that it is from two to three weeks earlier than the German millet, is a much heavier croper, that the hay is much finer, stalks more elastic and it grows much taller. It is rust-proof, and being of a strong, stooling habit, requires less seed per acre than other sorts. It would be well to test this new millet in all sections.

Japanese Millet.

This is also called Billion Dollar grass. It is also of recent introduction into this country and like the Siberian Millet, very strong claims are made for it. The crops that I have seen growing support the strongest claims made by its introducers. It is well worth a trial on every farm though it is not to be recommended for the far north.

Hungarian Millet.

This is one of our oldest varieties and better adapted for our northern states. It does best on very rich, moist soils. It does not do well in our southern states or in our dry sections. In the north it produces the finest quality of hay

Pearl or Cat-Tail Millet.

This valuable forage plant is sold by many seedsmen in the north and west as *Pencillaria*.

Pearl millet is a valuable forage plant for the southern farmer, but practically worthless for the northern states. In the south it grows to enormous height, often reaching the height of twelve feet. It spreads out a great deal, thus furnishing a great yield of forage.

It may be sown in drills or broadcast, though the better plan is to sow in drills three to four feet apart and cultivate. To be fed as a forage crop, it should be cut and fed when green. It is practically worthless for hay. There are many other varieties of millets and much more that could be said about millets, but enough is stated here to enable any reader to select and grow the best varieties.

However, I wish to repeat that millet deserves more general cultivation on the farms of our country.

Alfalfa.

HISTORY AND DESCRIPTION.

Alfalfa is a member of the clover family. It is a native of Southwestern Asia; it was introduced into Spain by the Saracens; from Spain it came into Mexico and from there spread to California and the Southwest part of the United States. However, it is well to state here that some writers claim that Alfalfa was brought and grown in New York State prior to its introduction into California. While these claims seem to be well founded yet it makes very little difference to the average farmer for the fact is well established that it came to this country in a very early date. Through all these changes it has preserved its Arabic name with the exception of a few instances, as when it was introduced into New York it was called Lucerne.

Alfalfa is found in a wild state in Afghanistan. We also have plants in the United States that so closely resemble alfalfa that in some sections these plants are called wild alfalfa. On a close

inspection of these plants we find but few of them entitled to be classed with alfalfa. Some of our clovers such as Melilotus or Sweet clover may deserve to be called a first cousin to alfalfa, so near alike are they.

Alfalfa has been grown in Southwestern Asia, Persia, Arabia and Egypt for more than three thousand years. It is indigenous to hot and semi-arid regions but under cultivation its field of usefulness has grown until it now embraces nearly every state in the Union and extends as far north as Turkistan in Asia, and to Alberta, in the Dominion of Canada yet the best results are obtained in the regions south of the 42nd parallel of latitude. It thrives remarkably well in Mexico where it has been grown for centuries and is yet the chief hay crop in that country.

Alfalfa is a perennial and when once set and it becomes established, with proper management it will continue to grow and give satisfactory returns for years. It grows from one to four feet high. The root development is wonderful and they penetrate the earth to a great depth for moisture. The root growth gives the plant such an unusual hold on the soil that from three to six crops may be harvested each year; the number of crops depend upon the season. A six-year-old plant will often possess a root as large as a man's arm. The roots are branching. The plant does not spread from the roots, but from the crown above the ground.

When the plants first appear above ground they present a tiny appearance and make rather a feeble growth until the roots get a good hold on the subsoil. Altitude does not seem to effect the growth where other conditions are favorable, for it thrives from sea level up to 8,000 feet above the sea. Alfalfa will stand almost any amount of surface drouth but there must be underground water, a damp but porous subsoil which the roots may reach.

King of Hay Crops.

While corn is king of our grain crops, alfalfa is king of our hay crops. From the earliest history of man alfalfa has been regarded as the

king of forage plants. There is no doubt in the mind of the writer but that the Patriarchs, Abraham and Jacob, fed their flocks and herds upon alfalfa. When the wicked king Nebuchadnezzar was dethroned and driven out to eat with the beasts of the field for seven years, no doubt but that he fed upon alfalfa. And to-day, after its use for thousands of years it is our greatest forage plant.

There is but one other hay known to the writer that has a higher feeding value than alfalfa and that is the cowpea hay. But when we come to count up all the advantages of these two great hay plants, the cost of seeding, growing and saving the hay, we find the balance in favor of alfalfa. While the hay from cowpeas has a higher feeding value, yet it costs more to produce it, it takes it longer to cure and is not so easily handled. Besides this, we can get but two crops at the most from one planting of cowpeas, while we get from one to six cuttings per year from alfalfa. One seeding of alfalfa should last for twelve years, while the peas have to be seeded each season. So that wherever alfalfa can be grown it would not pay to substitute cowpeas for alfalfa. But these two, greatest of all hay crops need not conflict with each other at all. The great advantage with the cowpea is that it can be used as a catch crop, where alfalfa and other clovers or grasses could not be used. They can be sown in corn fields at the last plowing of the corn, can be sown on stubble land after wheat is harvested or they may be used in building up and getting our lands in a fine condition for alfalfa.

Soil and Soil Preparation.

Alfalfa thrives best on rich, sandy soils, having a good well drained subsoil; soils with a rich top and a good gravelly or porous subsoil is best, though almost any land that will grow good crops of grain may be prepared so as to produce great yields of alfalfa. Much depends upon the water level in the soil; if this is within three feet of the surface it must be lowered or drawn off by drainage before such soils will produce

good crops of alfalfa. Good under-drainage and a rich top surface are the starting points in selecting and preparing soils for alfalfa. We have soils in nearly every state in the Union that can be made to grow it. Lime soils are well adapted for alfalfa; in fact, lime is absolutely necessary in order to obtain the best results and where the soil is deficient in lime, this must be provided if we expect to get the best results. Sandy soils deficient in lime should have at least one ton of pure rock lime applied per acre before seeding.

When to Sow.

The fall months are the best to sow alfalfa in Southwest Missouri and all sections south of this, while for sections north of this, spring would be the best time. Sow from 15 to 25 pounds seed per acre, the amount depending upon time and the condition of the soil.

When to Cut.

This depends upon the weather and the condition of the soil. Usually, when the crop is coming well into bloom is the best time to cut, but in case the weather is very dry, causing the leaves to turn yellow and fall off, it will be best to cut earlier, just as the first blooms appear.

How Long It Will Grow On Same Land.

While holding farmers meetings in one of our greatest alfalfa growing states, this question frequently came up and growers stated that after six years it would begin to give out and they thought it should be changed every sixth year. In my opinion, this depends entirely upon how the crop is managed. Alfalfa feeds largely upon nitrogen, much of which it gets from the air; and while this is true, yet it is at the same time using up phosphoric acid and potash, taking these from the soil. Now if we would restore each spring to the soil just a little bit more of

these two plant foods than the alfalfa took from the soil the previous season, this and cultivating the soil with a disk harrow every time we cut the crop, would enable us to prolong the life or usefulness of a field of alfalfa almost indefinitely.

Special Notice.

The writer has prepared a special bulletin on "Alfalfa" which gives far more information regarding alfalfa than I can give here. Every reader who is interested in growing this wonderful plant should send his name today and receive this bulletin free.

Johnson Grass.

(SORGHUM HALEPENSE.)

HISTORY AND DESCRIPTION.

Johnson grass is known under various names, such as Johnson grass, Guinea grass, etc. It seems to be a native of Africa, though it is known in Southern Europe and in various parts of the world. It was brought to the United States about 1830 and it is now well distributed over the entire cotton belt and is each year pushing its way into the northern and western states.

It belongs to the sorghum family of plants and so is better adapted for hay than for pasture, though where well managed it furnishes fine pasture as well as hay.

It thrives best on our heavy, black, lime soils, and while such soils seem to suit it best, yet it will grow almost as well on our rich clay soils, as well as on many rich, sandy soils.

It grows from three to ten feet high according to soil and is set from the ground up thick blades which furnish the greater part of its feeding value. It is inclined to grow rather thin on the land, and in order to avoid this, there should be an ample supply of good seed used so as to secure a good stand for where grown thin the hay is likely to grow too coarse and in this case it is difficult to cure.

Soil and Soil Preparation.

As before stated, Johnson grass will grow on nearly all rich soils, though our rich, black lime soils and rich, moist bottom lands suit it best. Soils for it should be broken deep and harrowed fine, the same as for other grasses and like all other grasses the richer the soil and the better it is prepared, the greater will be the yield of hay and profits. Where soils are deficient in lime this should be provided for.

Seeding.

The seed may be sown with a grain drill or broadcasted by hand, and the seed harrowed in. It would be a good plan to sow Melilotus and Johnson grass together, either for pasture or hay, using about forty pounds of Johnson grass and fifteen pounds of Melilotus seed per acre. The fall is the best season in which to sow this grass.

Harvesting.

Johnson grass seed should not be allowed to become ripe before it is cut for hay, but it should be cut when in or just passing out of bloom. The hay is not difficult to cure and a few days of clear, hot weather will cure it when it may be stacked, baled or stored in hay mows.

General Remarks.

Much has been said and written against Johnson grass, which has caused a great deal of undue dislike for it, for in my opinion it is a very useful grass for many sections of our country and especially so for the southern states. The greatest objection to it is that we cannot get rid of it when we desire to do so. If this was strictly true, this would be one of the strongest arguments in its favor, for any plant that will furnish as much fine feed for stock, and is a stayer, should be highly recommended and I, for one, am en-

couraging a more general cultivation of this valuable grass.

I have known farmers to pay men one dollar per day to destroy ten or fifteen dollars worth of Johnson grass on an acre of land in order to grow from four to eight dollars worth of cotton on the same land. Let the Johnson grass grow and get even with it by turning it into mutton, beef, wool, milk and butter fat.

At one of the County Farmers' Union Meetings held in Texas in the summer of 1907, an editor of one of the great Texas papers said in his speech that the state paid out annually about seventy per cent of its cotton money for grain, pork, hay and other foods for man and beast and yet the state of Texas has been trying to discourage the growing of this grass by legislation.

In February, 1907, I went to a city to give a lecture on agriculture. A young man came to the meeting and said he was in trouble and wanted my advice. He stated that he had over a thousand acres of rich, bottom land over-run with Johnson grass and wanted to know how to get clear of it. I told him to turn it into milk and sell the milk. I also told him that at that time cream was being hauled over three hundred miles to his town to make ice cream. This is what I said to him. "Go home, take a disk harrow and disk your Johnson grass field twice, at right angles, sow two bushels of oats per acre; when the oats are in the dough state and the grass is in bloom, cut from two to six tons of hay per acre, feed this to dairy cows and sell the milk. A ton of this hay should produce 1,100 pounds of milk which should test at least four per cent butter fat. As soon as this crop of hay is off, disk the field again, sow winter rye, not less than one bushel per acre or two bushels of the Tennessee winter barley, and if there are spots where the grass is too thin, sow a few seed on such spots. This will give you a fine winter pasture for young cows and the next spring you can repeat the oat operation again." This young man afterwards told me that he would not take \$500.00 for the information and he now has a herd of 300 dairy cows on his farm and he is hauling his Johnson

grass to the city and selling it at fancy prices in the form of milk and butter fat, while his neighbors are floundering around in mud and water fighting Johnson grass on their farms.

The question is often asked me, "Is there any way by which we can rid our fields of it?" To this question, let me suggest this plant. Where Johnson grass has taken entire possession of a field that you desire to plant to other crops, go at it in the fall, disk as stated above, sow to winter rye or Tennessee winter barley for pasture for the winter. In the spring, disk again the same way, sow oats, cut the grass and oats together for hay and as soon as this hay can be removed sow the field to cowpeas and sorghum, one bushel of each per acre; this will give another big crop of hay. As soon as this crop of hay is taken off, disk again and sow to winter rye or barley, pasture this during winter, take the stock off early in the spring, let the rye or barley get a start, then turn under and plant corn, cotton or any other crop desired on the field, as by this time there will be but little, if any, Johnson grass left in the soil. However, if there should be a few roots left which start growth in the crop, sow rye or barley again at the time of the last plowing of the cotton or corn. Keep up this rotation for several years and you can clear your soil of Johnson grass.

But why should a farmer want to get clear of a grass, which, with good management, will give as great profits as any other crop? While engaged in writing this, I am on a train passing through one of our cotton states and looking out from the windows on either side, we are passing through fields of cotton that will not make three hundred pounds of seed cotton per acre this season, 1907. It is possible for Johnson grass to be worse than this.

Of course we do not want it in our lawns, gardens, orchards or flower beds, and it will only require a little attention and work to keep it out of such places. It is certainly amusing to me when I point out in my car a sample of John-

son grass to farmers, for then they commence to caution me not to let a seed of it out in their towns, when at the same time there are patches of it growing all along the roadside and have been for several years and they have never noticed it. Such experiences are common, for the cattle from the south have carried the seed north until it is now to be found growing in nearly every town in Missouri, and it already has a good start in Illinois, Iowa and other northern states where it has become a fixture and proposes to stay.

Farmers frequently say that they are afraid to haul out manure from the stables in towns where Johnson grass hay is fed for fear of getting this grass started on their farms. This can all be avoided by hauling the manure, piling it and, letting it heat until the seeds are either burned or sprouted and the young plants are killed in the manure. I should not hesitate a moment but would haul out all the manure I could get and if there was Johnson grass seed in it, I would get clear of it before applying the manure to the ground.

Should the reader desire to grow one of the cheapest and best crops of hay that can be grown in this country, prepare your soil as outlined above, secure new Johnson grass seed, the sleek, heavy, black seed, sow and harvest as outlined above, sowing either alone or with Melilotus and you will have no trouble in procuring profitable crops of hay.

When ready to change fields, smother out the old fields by pasture and hay crops as directed instead of trying to kill it by cultivation. It can be pastured and smothered out, but to attempt to cultivate it out would be like the Irishman and his mole. A mole got into his garden and rooted under his onions and peas which caused the Irishman and his wife much anxiety. So they watched for him and finally caught him. A consultation was held as to how they should kill him so as to inflict the most punishment upon him. Pat after much thought decided to bury him alive.

Timothy and Red Clover.

Timothy and clover have been grown together for hay in this country for years and is yet regarded by many farmers as the leading hay in feeding value. There are many sections where farmers will continue to grow timothy and clover hay no matter what other new clovers or 'grasses may be introduced. Timothy is grown alone for hay in many sections of this country and where properly managed, cut and cured at the right time it makes a hay of very high feeding value.

For a more detailed description of both timothy and clover, as well as hay of both plants, I would refer the reader to my bulletin on "Grasses and Clovers," pages 11, 12, 13, 14 and 20.

Red Top Grass.

Red Top Grass is grown in many sections for both pasture and hay; however, its chief value is for pasture and so is not to be recommended for hay except to be grown on wet lands where better grasses cannot be grown. When wanted for hay it is best to sow Alsike clover with it as the two grown together make a good quality of hay.

For further information regarding Red Top and Alsike clover for hay I would refer the reader to my bulletin on "Grasses and Clover," page 21.

Tall Meadow Oat Grass.

This hardy perennial grass is coming into more general use in many sections of our country and especially so in the south and west. While it will grow on almost any good, rich soil, yet I find it well adapted for our lowlands and regard it as a better grass to sow with Alsike clover than even the Red Top. The Red Top will grow on wet, sour soils where the oat grass might prove a failure. But where the land has even partial drainage, I would recommend the use of the oat grass. This grass roots deep and furnishes

both pasture and hay. Oat grass and Alsike clover may be sown together for hay or pasture, by the same methods as recommended in the bulletin on Grasses and Clovers.

Oat grass and Mammoth clover may be sown together for hay and will make an excellent quality of hay for feed. The Oat grass produces an abundance of fine blades from the ground to the top. Like Orchard grass it comes early and stays late. Its habits of growth and size are about the same as those of the Orchard grass, growing from two to four feet tall.

Orchard Grass and Clover.

In many sections of our country, Orchard grass and clover form a better combination for hay than timothy and clover. Unfortunately, Orchard grass has been badly named as the name indicates that it is a grass, suitable for orchards and timber lands or shaded places. This gives a bad impression, for while it is well adapted for such locations, it is equally as well suited for field culture. In fact, my experience and observation leads me to conclude that it is the best all-round grass that we have. For all timber sections and for all clay soils it has no equal, either for hay or pasture. It deserves a much more general cultivation.

On some soils such as low, heavy, wet lands it would be best to use Alsike instead of the Sapping or Mammoth clover with the Orchard grass. One of the most common objections to Orchard grass is that it grows in tufts; this comes largely from the fact that it is allowed to grow scattering. To overcome this, it should be sown thick and none but good, fresh seed used. If two bushels of new, clean seed are sown per acre, together with ten pounds of Mammoth clover seed, the two will form a dense growth, make an enormous yield of hay of the very best quality. The two bloom together and should be cut while in bloom for hay.

Of course, the Orchard grass, being a stronger grower and a longer lived plant will crowd the clover out in two years. In such event, the grass should be cut close, put on a disk, again sow clover seed and smooth over with a smoothing harrow. For further information on Orchard grass, see my bulletin on Grasses and Clovers, page 22.

The country tributary to the Rock Island-Frisco Lines best adapted for Orchard grass (*Dactylis Glomerata*), embraces all of our territory in Alabama, Tennessee, Mississippi, the northern sections of Arkansas, up to and including Central Iowa, up to and including Central Illinois, all of Indian Territory and many sections of Kansas and Nebraska. In fact, Orchard grass may be successfully grown on nearly all the clay soils tributary to the Rock Island-Frisco Lines.

Other Plants Suitable for Hay.

We have many other plants that are suitable for hay, such as wheat, rye, oats, barley, giant beggar weed, Mexican clover, water or goose grass, crab grass, rag weeds and our

Prairie Grasses.

These grasses have been giving us fine crops of hay, but they are giving out, for our prairies are being broken and put into cultivation so fast that this makes it of greater importance that we give more attention to the growing of hay crops on our farms. In many of our western states alfalfa will take the place of the wild hay and it is fast becoming the great forage plant in many sections of the south and west.

In concluding this book, let me urge that every reader provide an ample supply of pasture and hay, build up the dairy industry, feed the stock, let the stock feed the soil, so that we may grow great crops of grain to feed the world.

Summary.

We should provide an ample supply of hay for all stock on the farm.

The best hay crops are grown on rich, well prepared soils.

We need not to expect to get paying crops of hay from crops that are pastured heavily.

Where pasture is wanted, sow for pasture.

With a little effort every farmer can have a sufficient quantity of hay for all his stock.

We have hay plants suited for nearly all soils and climates.

Farmers should experiment with the different hay crops, and thus determine which is best adapted for his soil.

Varieties of plants have much to do in determining the value of the crop.

None but the best varieties of all crops should be used.

For best results, hay should not be left exposed to either rain or sun too long. Get the hay out of the weather as soon as possible after it is cut.

Some hay crops need more sunshine than others.

With the great number of forage plants at our command, there is no good reason why stock should be starved.

When pastures are short stock, especially milk cows, should be fed soiling crops.

Grasses, clover and live stock form the foundation of agricultural wealth.

Should you wish to become wealthy farming, send for a full set of our free bulletins which will tell you how to make the farm pay. Should you need information on any agricultural or horticultural subject write for same to

F. S. WHITE,
Agricultural and Horticultural Commissioner,
Rock Island-Frisco Lines,
Frisco Building, St. Louis Mo.

VALUABLE REFERENCE TABLES.

TABLE No. 1.

Table, showing the number of hills or plants on an acre of land, for any distance apart from 10 inches to 6 feet—the lateral and longitudinal distance being unequal.

	10-in.	12-in.	15-in.	18-in.	20-in.	2-ft.	2½-ft.	3-ft.	3½-ft.	4-ft.	4½-ft.	5-ft.	5½-ft.	6-ft.
10-in.	62726													
12-in.	52272	43560												
15-in.	41817	34848	27878											
18-in.	34848	29040	23232	19360	15681									
20-in.	31363	26136	20908	17424	13068									
2-ft.	26136	21780	17424	14520	10454	10890								
2½-ft.	20908	17424	13939	11616	8712	8712	6969							
3-ft.	17424	14520	11616	9680	8712	7260	5808	4840						
3½-ft.	14935	12446	9953	8297	7467	6223	4976	4148	3555					
4-ft.	13068	10890	8712	7260	6534	5445	4365	3630	3111	2722				
4½-ft.	11616	9680	7744	6453	5808	4840	3872	3226	2767	2428	2151			
5-ft.	10454	8712	6969	5808	5227	4356	3484	2904	2489	2178	1936	1742		
5½-ft.	9504	7920	6336	5280	4752	3960	3168	2640	2263	1980	1760	1584	1440	
6-ft.	8712	7260	5808	4840	4356	3630	2904	2420	2074	1865	1613	1452	1320	1210

EXPLANATION—Find the distance between your plants or hills the longest way in the left hand column, then trace the line to the right, until it reaches the column of the number that expresses the distance of the short way, where you will find the number wanted.

EXAMPLE—The rows of corn in a corn field are $5\frac{1}{2}$ feet apart, and the plants 20 inches apart, in drill or hill; what will be the number of hills or plants in an acre

SOLUTION—Find $5\frac{1}{2}$ feet (the distance of the rows apart) in the left hand column, then trace the line along unto the column headed by 20 inches (the distance of the plants or hills apart), and you have 4,752—Answer.

This is a very valuable table as it will quickly enable you to determine exactly what you are getting from an acre of your land. For instance, every farmer wants to or should know what each acre of his corn is producing, and since I have been teaching that it is possible to bring the average corn crop of this country up to fifty bushels per acre instead of the present low average of twenty-five bushels, this table will show the farmer at a glance how such results may be obtained.

Corn planted in drills three and one-half feet apart and one stalk in a hill every eighteen inches gives 8,297 stalks. Now, suppose we make each stalk, as we can do, give an ear weighing one pound. This gives 8,297 pounds, and 70 pounds per bushel gives us $118\frac{1}{2}$ bushels per acre. Suppose we cut this in half, we still have $59\frac{1}{4}$ bushels per acre, so there should be no difficulty in growing fifty bushels of corn per acre. With this table it will be an easy matter to weigh or count the product of average hills or plants and so figure very closely as to the yield of all crops per acre.

Comparative Nutritive Value of Different Crops.

TABLE NO. 2.

The comparative difference between good hay, (and let us take for our unit of measure some of the good hays as cowpeas and sorghum hay, alfalfa hay, or a combination of orchard grass and clover hay) and other articles as food for stock, being the results of experiments only.

10 lbs. hay equal.

Clover hay.....	8 to 10 lbs.
Green clover.....	45 to 50 lbs.
Wheat straw.....	40 to 50 lbs.
Barley straw.....	20 to 40 lbs.
Oat straw.....	20 to 40 lbs.
Pea straw.....	10 to 15 lbs.
Potatoes.....	20 to 25 lbs.
Carrots (red).....	25 to 30 lbs.
Carrots (white).....	40 to 45 lbs.
Mangold wurtzel.....	30 to 35 lbs.
Turnips.....	45 to 50 lbs.
Cabbage.....	20 to 30 lbs.
Peas and beans.....	3 to 5 lbs.
Wheat.....	5 to 6 lbs.
Barley.....	5 to 6 lbs.
Oats.....	4 to 7 lbs.
Indian corn.....	5 to 7 lbs.
Oil cake.....	2 to 4 lbs.

TABLE NO. 3.

The difference between good hay and other articles as food for stock shown, being the combination of experiments and theory.

100 lbs. hay equal.

Green Indian corn.....	275 lbs.
Rye straw.....	442 lbs.
Wheat straw.....	360 lbs.
Oat straw.....	164 lbs.
Barley straw.....	180 lbs.
Pea straw.....	153 lbs.
Buckwheat straw.....	200 lbs.
Raw potatoes.....	201 lbs.

Boiled potatoes.....	175 lbs.
Mangold wurzel.....	504 lbs.
Turnips.....	504 lbs.
Carrots.....	300 lbs.
Rye.....	54 lbs.
Wheat.....	46 lbs.
Oats.....	59 lbs.
Peas and beans mixed.....	45 lbs.
Buckwheat.....	64 lbs.
Indian corn.....	57 lbs.
Acorns.....	68 lbs.
Wheat bran.....	105 lbs.
Rye bran.....	109 lbs.
Wheat, pea and oat chaff.....	167 lbs.
Rye and barley, mixed.....	179 lbs.

TABLE NO. 4.

By experiments it has been shown that each 100 pounds of live weight of an animal requires of hay (or its equivalent), per day, as follows:

Working horses.....	3.08 lbs.
Fatting oxen.....	5.00 lbs.
Fatting oxen when fat.....	4.00 lbs.
Milch cows.....	2.25 to 2.40 lbs.
Dry cows.....	2.42 lbs.
Young growing cattle.....	3.08 lbs.
Working oxen.....	2.40 lbs.
Steers.....	2.84 lbs.
Pigs.....	3.00 lbs.
Sheep.....	3.00 lbs.

As the ox consumes from 20 to 40 ounces of gluten or albumen daily, the following weights of vegetable food will supply this amount:

Meadow hay.....	20 lbs.
Clover hay.....	16 lbs.
Oat straw.....	110 lbs.
Pea straw.....	12 lbs.
Potatoes.....	60 lbs.
Carrots.....	70 lbs.
Turnips.....	120 lbs.
Cabbage.....	70 lbs.
Wheat or other white grain.....	11 lbs.
Beans or peas.....	6 lbs.
Oil cake.....	4 lbs.

Field Seeds.

TABLE NO. 5.

NOTE—These estimates apply for strictly first-class fresh seeds.

Quantity required per acre:

Barley.....	2½ bu.
Beans, field, dwarf.....	1 bu.
Beans, field, Pole.....	½ bu.
Corn, Field.....	4 to 5 qts.
Corn, Pop.....	4 to 6 qts.
Corn, Sugar.....	6 to 8 qts.
Corn, Broom.....	4 to 8 qts.
Clover, Alfalfa (Lucerne).....	20 to 25 lbs.
Clover, Alsike or Swedish.....	6 to 8 lbs.
Clover, Crimson.....	10 to 15 lbs.
Clover, Mammoth.....	8 to 12 lbs.
Clover, Medium, Red.....	8 to 12 lbs.
Clover, White Dutch.....	6 to 8 lbs.
Clover, Japan.....	12 to 15 lbs.
Clover, Melilotus.....	15 to 20 lbs.
Clover, Burr.....	25 to 30 lbs.
Grass, Kentucky Blue.....	2 bu.
Grass, English Blue.....	7 bu.
Grass, Red Top.....	8 to 10 lbs.
Grass, Timothy.....	¼ bu.
Grass, Orchard.....	2 bu.
Grass, Tall Meadow Oat.....	2 bu.
Grass, Perennial, English Rye.....	2 bu.
Grass, Italian Rye.....	2 bu.
Grass, Annual Sweet Vernal.....	5 lbs.
Grass, Rescue or Arctic.....	25 to 45 lbs.
Grass, Awnless Brome.....	40 lbs.
Grass, Bermuda.....	10 lbs.
Grass, Lawn.....	40 to 60 lbs.
Grass, Johnson.....	40 to 50 lbs.

Miscellaneous Farm seeds:

Dwarf Essex Rape.....	4 to 6 lbs.
Buckwheat.....	1 bu.
Velvet beans.....	¼ bu.
Soja beans.....	½ to 1 bu.
Sorghum, Broadcast.....	1 to 2 bu.
Kaffir corn, drills.....	½ bu.
Hemp for seed, drills.....	¼ bu.

Hemp, Broadcast.....	1 $\frac{1}{4}$ bu.
Peas, field.....	1 to 2 bu.
Oats.....	$\frac{1}{2}$ to 3 bu.
Rye.....	1 to 1 $\frac{1}{2}$ bu.
Wheat.....	$\frac{3}{4}$ to 1 $\frac{1}{2}$ bu.
Flax.....	$\frac{1}{2}$ bu.
Peanuts in hull.....	2 bu.
Sunflower.....	8 lbs.
Vetches.....	2 bu.

TABLE No. 6.

Quantity of seeds requisite to produce a given number of plants and to sow per acre.

	Quantity per acre.
Artichoke, 1 oz. to 500 plants.....	6 oz.
Asparagus, 1 oz. to 800 plants.....	5 lbs.
Asparagus roots.....	1,000 to 7,250
Beans, dwarf, 1 pt. to 100 feet of drill.....	1 bu.
Beans, Pole, 1 pt. to 100 hills.....	$\frac{1}{2}$ bu.
Beet, garden, 1 oz. to 100 feet of drill.....	7 lbs.
Beet, Mangel, sugar, 1 oz. to 100 ft. drill..	5 lbs.
Brocoli, 1 oz. to 5,000 plants.....	2 oz.
Brussels sprouts, 1 oz. to 5,000 plants.....	2 oz.
Cabbage, 1 oz. to 3,000 plants.....	4 oz.
Carrot, $\frac{1}{4}$ oz. to 100 feet of drill.....	2 $\frac{1}{2}$ lbs.
Cauliflower, 1 oz. to 2,500 plants.....	2 $\frac{1}{2}$ oz.
Celery, 1 oz. to 10,000 plants.....	3 oz.
Collards, 1 oz. to 3,000 plants.....	4 oz.
Cucumbers, 1 oz. to 100 hills.....	1 to 3 lbs.
Egg plant, 1 oz. to 2,000 plants.....	4 oz.
Endive $\frac{1}{4}$ oz. to 100 feet of drill.....	2 $\frac{1}{2}$ lbs.
Garlic bulbs, 10 lbs. to 100 feet of drill.....	
Gourd, 2 oz. to 100 hills.....	
Horseradish roots.....	10,000 to 15,000
Kale, 1 oz. to 3,000 plants.....	2 lbs.
Kohl Rabi, $\frac{1}{3}$ oz. to 100 feet of drill.....	2 lbs.
Leek, $\frac{1}{3}$ oz. to 100 feet of drill.....	2 lbs.
Lettuce, $\frac{1}{2}$ oz. to 100 feet of drill.....	2 lbs.
Martynia, 1 oz. to 100 feet of drill.....	4 lbs.
Muskmelon, 1 oz. to 100 hills.....	1 to 3 lbs.
Mustard, Broadcast.....	$\frac{1}{2}$ lb.
Nasturtium, 1 oz. to 100 feet of drill.....	8 lbs.
Okra, 1 oz. to 100 feet of drill.....	8 lbs.
Onion seed, $\frac{1}{3}$ oz. to 100 feet of drill...	4 to 5 lbs.

Onion seed, for sets.....	40 to 60 lbs.
Onion sets, 1 qt. for 40 feet of drill	8 bu.
Parsnip, $\frac{1}{4}$ oz. to 100 feet of drill.....	3 lbs.
Parsley, $\frac{1}{4}$ oz. to 100 feet of drill.....	3 lbs.
Peas, garden, 1 pt. to 100 feet of drill. 1 to 3 bu.	
Pepper, 1 oz. to 1,500 plants.....	3 oz.
Pumpkin, $\frac{1}{3}$ qt. to 100 hills.....	3 to 4 lbs.
Radish, $\frac{2}{3}$ oz. to 100 feet of drill.....	3 to 5 lbs.
Rhubarb, 1 oz. for 500 plants.....	
Sage.....	4 to 5 lbs.
Salsify, $\frac{3}{4}$ oz. to 100 feet of drill.....	8 lbs.
Spinach, $\frac{1}{2}$ oz. to 100 feet of drill.....	8 lbs.
Summer Savory	$\frac{3}{4}$ lb.
Squash, summer, 4 oz. to 100 hills	1 lb.
Squash, winter, 8 oz. to 100 hills.....	2 lbs.
Tomato, 1 oz. to 4,500 plants.....	1 oz.
Tobacco, 1 oz. to 5,000 plants.....	2 oz.
Turnips, 1 oz. to 150 feet of drill.....	1 to 3 lbs.
Watermelon.....	1 to 2 lbs.

Distances Recommended For Planting.

TABLE NO. 7.

Apples (standard).....	20 to 30 feet each way
Apples (dwarf).....	6 to 10 feet each way
Pears (standard).....	20 feet each way
Pears (dwarf).....	10 to 15 feet each way
Quinces.....	12 feet each way
Peaches.....	18 to 20 feet each way
Plums.....	8 to 12 feet each way
Cherries.....	14 to 20 feet each way
Figs.....	10 to 15 feet each way
Japan persimmons.....	20 to 25 feet each way
Mulberries.....	20 to 25 feet each way
Blackberries.....	6 to 8 feet by 4 feet
Raspberries.....	6 by 2 feet
Currants.....	4 to 5 feet by 4 feet
Gooseberries.....	4 to 5 feet by 4 feet
Strawberries, hills.....	15 by 15 inches
Strawberries, matted rows	4 by 1 foot
Asparagus.....	4 by 2 feet
Rhubarb.....	4 by 2 feet
Grapes.....	8 by 9 feet
Oranges.....	20 by 20 feet

Weight of Various Seeds Per Bushel.

TABLE NO. 8.

Barley.....	48 lbs.
Beans.....	60 lbs.
Broomcorn seed.....	30 lbs.
Buckwheat.....	48 lbs.
Canary seed.....	60 lbs.
Castor beans.....	46 lbs.
Clover seed.....	60 lbs.
Corn, field, shelled.....	56 lbs.
Corn, field, on ear.....	70 lbs.
Flaxseed.....	56 lbs.
Grass, Rhode Island Bent.....	14 lbs.
Grass, Creeping Bent.....	20 lbs.
Grass, Red Top (in chaff).....	14 lbs.
Grass, Red Top (cleaned from chaff).....	32 lbs.
Grass, Meadow Foxtail.....	7 lbs.
Grass, Tall Meadow Oat.....	10 lbs.
Grass, Awnless Brome.....	14 lbs.
Grass, Orchard Grass.....	14 lbs.
Grass, Hard Fescue.....	12 lbs.
Grass, Tall Fescue.....	14 lbs.
Grass, Sheep's Fescue.....	12 lbs.
Grass, Meadow Fescue or English Blue Grass.....	22 lbs.
Grass, Perennial Rye.....	20 lbs.
Grass, Timothy.....	45 lbs.
Grass, Wood Meadow.....	14 lbs.
Grass, Kentucky Blue.....	14 lbs.
Grass, Fowl Meadow.....	12 lbs.
Grass, Rough Stalked Meadow.....	14 lbs.
Hungarian.....	48 lbs.
Hemp seed.....	44 lbs.
Millet, German or Golden.....	50 lbs.
Millet.....	50 lbs.
Oats.....	32 lbs.
Peanuts.....	22 lbs.
Peas, smooth.....	60 lbs.
Peas, wrinkled.....	56 lbs.
Rape.....	50 lbs.
Rye.....	56 lbs.
Vetches or Tares.....	60 lbs.
Wheat.....	60 lbs.

Weight of miscellaneous articles	per bushel.
Apples, dried	24 lbs.
Bran	20 lbs.
Coal, lump	80 lbs.
Coal, charcoal	20 lbs.
Corn meal	48 lbs.
Lime, unslacked	80 lbs.
Malt	38 lbs.
Onions	56 lbs.
Peaches, dried	33 lbs.
Plastering, hair	8 lbs.
Potatoes, Irish	60 lbs.
Potatoes, sweet	46 lbs.
Salt, coarse	50 lbs.
Turnips	50 lbs.

Comparative Cost of Raising Corn and Pork.

TABLE NO. 9.

There is always a demand for information regarding the relative value of corn and pork. Therefore, we submit the following as a guide in such matters.

By the results of experiments, one bushel of corn, weighing 56 pounds, will produce ten and one-half pounds of pork. Deducting one-fifth to come at the net weight, would give eight and three-fifths pounds of pork as the product of one bushel of corn, or one pound of pork as the product of six and two-thirds pounds of corn.

The price of pork per pound at different prices per bushel for corn, shown.

Corn per bushel.	Pork per pound.
Cents.	Cents.
12½	1.50
15	1.78
17	2.00
20	2.38
22	2.62

Corn per bushel. Cents.	Pork per pound. Cents.
25	2.96
30	3.57
33	3.92
35	4.00
38	4.52
40	4.76
42	5.00
45	5.35
50	5.95
55	6.54
60	7.14
65	7.74
70	8.57

By reversing the above, we can obtain the price of corn per bushel at different prices per pound for pork. The use of the above comparison is obvious. For instance, should corn be selling for fifty cents per bushel, and pork for only five cents per pound, it would be most profitable to sell the corn; but should the corn be selling at forty cents per bushel and pork for six cents per pound, it would be most profitable to reduce the corn to pork, and sell the latter.

To find the price of pork per pound, taking the price of corn per bushel as the standard, divide the price of corn by 8.40 (the number of pounds of pork produced by a bushel of corn).

To find the price of corn per bushel, taking the price of pork per pound, as the standard, multiply the price of a pound of pork by 8.40.

Depth of Sowing Wheat.

TABLE No 10.

The depth of sowing wheat must vary with the soil. A thinner covering is required in a heavy than in a light soil. Experiments give the following results:

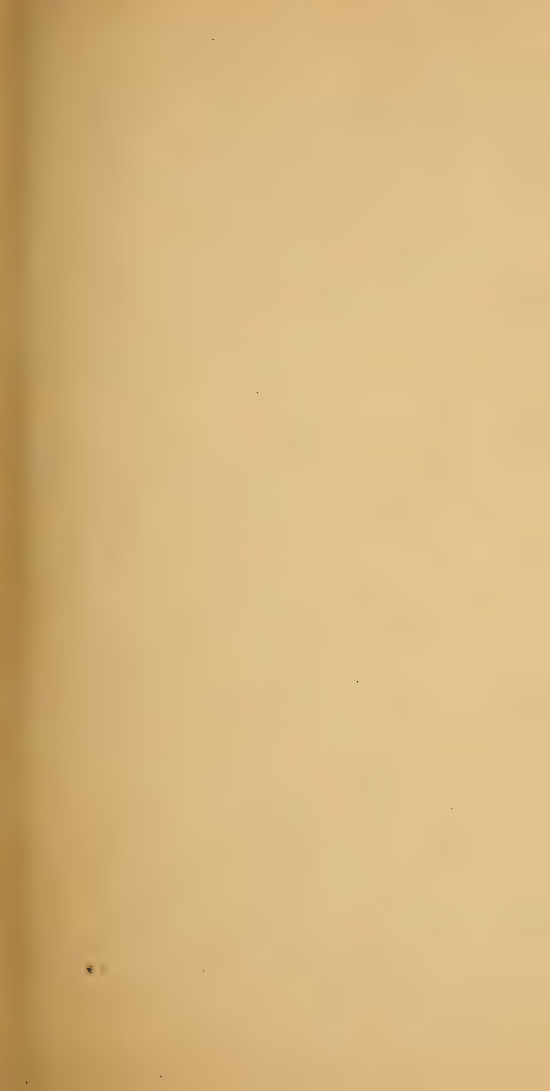
	Appeared above ground in	No. of Plants that Came Up
Seeds sown to depth of $\frac{1}{2}$ inch	11 days	$\frac{7}{8}$
Seeds sown to depth of 1 inch	12 days	all
Seeds sown to depth of 2 inches	18 days	$\frac{7}{8}$
Seeds sown to depth of 3 inches	20 days	$\frac{3}{4}$
Seeds sown to depth of 4 inches	21 days	$\frac{1}{2}$
Seeds sown to depth of 5 inches	22 days	$\frac{2}{3}$
Seeds sown to depth of 6 inches	23 days	$\frac{1}{3}$

TABLE NO. 11.

The number of plants, hills or trees contained in an acre at given distances apart, from 3 inches up to 66 feet.

Distance apart.	Number.
3 inches by 3 inches.....	969,960
4 inches by 4 inches.....	392,040
6 inches by 6 inches.....	174,240
9 inches by 9 inches.....	77,440
1 foot by 1 foot.....	43,560
$1\frac{1}{2}$ feet by $1\frac{1}{2}$ feet.....	19,360
2 feet by 1 foot.....	21,780
2 feet by 2 feet.....	10,890
$2\frac{1}{2}$ feet by $2\frac{1}{2}$ feet.....	6,960
3 feet by 1 foot.....	14,520
3 feet by 2 feet.....	7,260
3 feet by 3 feet.....	4,840
$3\frac{1}{2}$ feet by 1 foot.....	12,446
$3\frac{1}{2}$ feet by 2 feet.....	6,223
$3\frac{1}{2}$ feet by 3 feet.....	4,148
$3\frac{1}{2}$ feet by $3\frac{1}{2}$ feet.....	3,555
4 feet by 1 foot.....	10,890
4 feet by $1\frac{1}{2}$ feet.....	7,790
4 feet by 2 feet.....	5,445
4 feet by $2\frac{1}{2}$ feet.....	4,356
4 feet by 3 feet.....	3,630
4 feet by 4 feet.....	3,630
4 feet by 4 feet.....	2,722
$4\frac{1}{2}$ feet by $4\frac{1}{2}$ feet.....	2,151
5 feet by 3 feet.....	2,901
5 feet by 4 feet.....	2,178
5 feet by 5 feet.....	1,743

Distance apart.	Number.
5½ feet by 5½ feet.....	1,417
6 feet by 6 feet.....	1,210
6½ feet by 6½ feet.....	1,031
7 feet by 7 feet.....	881
8 feet by 1 foot.....	5,445
8 feet by 3 feet.....	1,815
8 feet by 8 feet.....	680
9 feet by 9 feet.....	537
10 feet by 1 foot.....	4,356
10 feet by 6 feet.....	726
10 feet by 10 feet.....	435
11 feet by 11 feet.....	360
12 feet by 1 foot.....	3,630
12 feet by 5 feet.....	736
12 feet by 12 feet.....	302
13 feet by 13 feet.....	257
14 feet by 14 feet.....	222
15 feet by 15 feet.....	194
16 feet by 1 foot.....	2,722
16 feet by 16 feet.....	170
17 feet by 17 feet.....	150
18 feet by 18 feet.....	134
19 feet by 19 feet.....	120
20 feet by 20 feet.....	108
25 feet by 25 feet.....	69
30 feet by 30 feet.....	48
33 feet by 33 feet.....	40
40 feet by 40 feet.....	27
50 feet by 50 feet.....	17
60 feet by 60 feet.....	12
66 feet by 66 feet.....	10



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